DRAFT

NWA 4797

Highly-shocked lherzolitic shergottite

15 grams

Introduction

Irving et al. (2008) reported on a small ultramafic shergottite with dramatic shock features. It was found in Morocco in 2001. It has a fusion crust on one side, and is cut by several veins of glass produced by shock.

Petrography

NWA4797 is primarily olivine and clinopyroxene. Large oikocrysts of zoned clinopyroxene enclose mm-sized chadocrysts of olivine (figure 1). Interstitial regoins have been to shocked to vesicular glass, with very small birefringent microlites of plagioclase. Acccessory phases include Ti-chromite, Mg-ilmenite, merrillite and pyrrhotite.

Walton et al. (2009) found the olivine and pyroxene in NWA4797 was highly shocked with strong mosaicism, pervasive facturing and partial melting at grain boundaries. Plagioclase in the interstitial regions has been completely melted and vesiculated. Walton et al. conclude the shock pressure was at least 60 GPa.

Chemistry

The chemical composition of NWA4797 has been determined by Korotev and reported by Irving et al. 2008 (table 1). The REE pattern is low and flat (figure 2). The overall composition has been calculated from the mode by Walton et al. (2009).

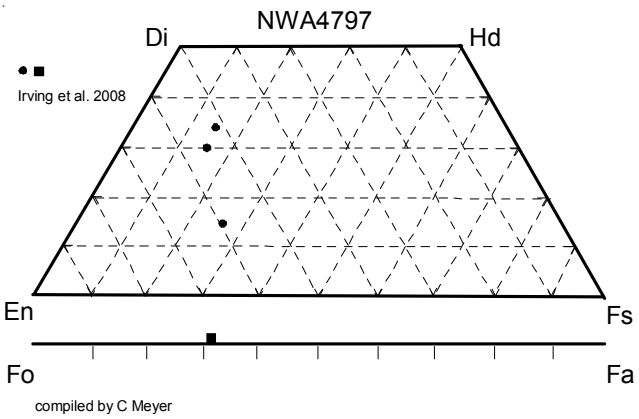

Figure 1: Olivine and pyroxene composition for NWA4797 (from Irving et al. 2008).

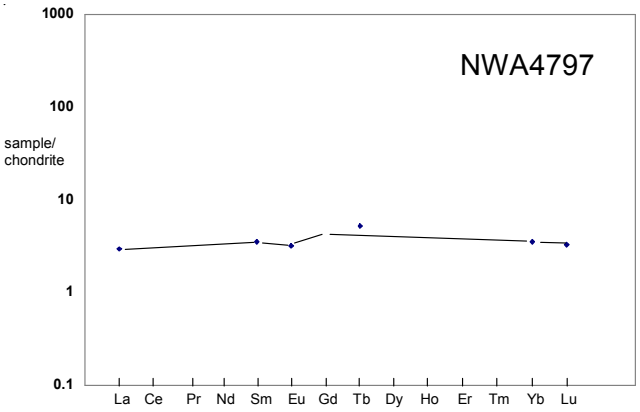

Figure 2: Normalized rare-earth-element diagram for NWA4797 (data from table 1).

Mineralogic Mode for NWA4797

Olivine	40.3
Opx	22.1
Cpx	11.8
Plagioclase gl.	9.1
Chromite	3.5

Table 1. Chemical composition of NWA 4797.

reference	Irving 2008		Walton09		Connolly08	
weight					shock	vein
SiO2 %			41.6	(b)	58.7	(c)
TiO2			0.4	(b)	1.4	(c)
Al2O3			3.7	(b)	14.3	(c)
FeO	19.6	(a)	19.9	(b)	6.5	(c)
MnO			0.5	(b)	0.22	(c)
MgO			25.6	(b)	2.1	(c)
CaO			4.7	(b)	11.8	(c)
Na2O	0.4	(a)	0.7	(b)	2.7	(c)
K2O			0.1	(b)	0.12	(c)
P2O5			0.4	(b)	1.8	(c)
S %						
sum						
Sc ppm	26.3	(a)				
V						
Cr	6620	(a)	13700	(b)		
Co						
Ni	330	(a)				
Cu						
Zn						
Ga						
Ge ppb						
As						
Se						
Rb						
Sr						
Y						
Zr						
Nb						
Mo						
Ru						
Rh						
Pd ppb						
Ag ppb						
Cd ppb						
In ppb						
Sn ppb						
Sb ppb						
Te ppb						
Cs ppm						
Ba						
La	0.69	(a)				
Ce						
Pr						
Nd						
Sm	0.52	(a)				
Eu	0.18	(a)				
Gd						
Tb	0.19	(a)				
Dy						
Ho						
Er						
Tm						
Yb	0.57	(a)				
Lu	0.08	(a)				
Hf	0.55	(a)				
Ta						
W ppb						
Re ppb						
Os ppb						
Ir ppb						
Pt ppb						
Au ppb						
Th ppm	0.1	(a)				
U ppm						

technique: (a) INAA, (b) calculated from mode, (c) elc. Probe

References for NWA4797

Connolly H.C. and 7 authors (2008) The Meteoritical Bulletin, No. 93, 2008 March. *Meteoritics & Planet. Sci.* **43**, 571-637.

Irving A.J., Bunch T.E., Kuehner S.M., Korotev R.L. and Classen N.C. (2008) Unique ultramafic shergottite Northwest Africa 4797: A highly shocked Martian wehrlite cumulate related to enriched basaltic (not "lherzolitic") shergottites (abs#2047). *Lunar Planet. Sci.* **XXXIX**. Lunar Planet. Institute, Houston.

Walton E.L., Irving A.J., Bunch T.E., Kuchner S.M. and Herd C.D.K. (2009) Extreme shock effects in relatively enriched shrgottite Northwest Africa 4797 (abs#1464). *Lunar Planet. Sci.* **XL**, . Lunar Planet. Institute, Houston.